

WATER PUMPING AND CONTROLLING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a water pumping system, and
5 more particularly to a water pumping and controlling device for a
water pumping system having an automatic detecting and
controlling mechanism.

2. Description of the Prior Art

Various kinds of typical motors have been developed and
10 provided for water pumping purposes. However, the typical motors
may be used for pumping water only, but may not be switched on
and switched off automatically.

For example, for typical water storing tanks, typical toilet
flush tanks, etc., a float device is required to be provided and
15 received in the tanks, to control the water flowing into and out of
the tanks, and/or to control the water level in the tanks.

However, for thermos bottles, it will be difficult to dispose a
float device within the thermos bottles to control the flowing of the
water into and out of the thermos bottles.

20 The present invention has arisen to mitigate and/or obviate the
afore-described disadvantages of the conventional water pumping
devices.

SUMMARY OF THE INVENTION

The primary objective of the present invention is to provide a
25 water pumping system having a water pumping and controlling
device for detecting and/or controlling the flowing of the water into
and out of water containers or reservoirs or the like automatically.

In accordance with one aspect of the invention, there is provided a water pumping system comprising a reservoir for receiving water, a motor coupled to the reservoir to pump the water out of the reservoir, a resistor coupled to the motor, a comparator circuit coupled to the resistor, the resistor being provided to
5 generate a voltage signal and to send the voltage signal to the comparator circuit, to determine whether the motor is loaded or unloaded, and a control device coupled to the comparator circuit, to switch off the motor when the motor is unloaded or do not pump
10 water, and to maintain the driving of the motor when the motor is still loaded. The motor may be switched off when the motor pumps no water, or when the reservoir is empty.

The resistor may either be coupled in front of the motor or coupled behind the motor to generate the voltage signal.

15 The comparator circuit includes a first amplifier coupled to the resistor to receive the voltage signal from the resistor, and a second amplifier coupled between the first amplifier and the control device.

A power supply circuit may further be provided and coupled to the motor, to supply electric energy to energize the motor, to couple
20 the motor either to a DC power or an AC power.

For example, the power supply circuit includes two transistors and a second resistor coupled between the transistors, for coupling to the DC power, or includes a TRIAC (Triode AC Switch or triggering bi-directional thyristor) for coupling to the AC power.

25 Further objectives and advantages of the present invention will become apparent from a careful reading of the detailed description provided hereinbelow, with appropriate reference to the

accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of a water pumping system having a water pumping and controlling device in accordance with the
5 present invention;

FIG. 2 is a block diagram of the water pumping and controlling device;

FIG. 3 is a plan view illustrating an electric circuit of the water pumping and controlling device, having a direct current power
10 input;

FIG. 4 is a plan view similar to FIG. 3, illustrating the electric circuit of the water pumping and controlling device, having an alternate current power input; and

FIG. 5 is a block diagram similar to FIG. 2, illustrating the
15 other arrangement of the electric circuit of the water pumping and controlling device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, and initially to FIG. 1, a water pumping system in accordance with the present invention comprises
20 a water tank or reservoir 10, and a water pumping and controlling device 30 coupled to the reservoir 10 to pump and to control the water outward flowing from the reservoir 10 to a container 20, for example.

A filter 11 may be disposed within the reservoir 10 to filter the
25 water, and another filter or a water outlet device 12 may further be provided and coupled to the water pumping and controlling device 30 for further filtering the water before the water flows into the

container 20.

Referring next to FIGS. 2 and 3, illustrated is one example of the water pumping and controlling device 30 which includes a motor 31 coupled to the reservoir 10 for pumping water out of the reservoir 10 to the container 20, and a power supply circuit 33 coupled to the motor 31 for supplying electric power to energize the motor 31. The power supply circuit 33 may couple the motor 31 to either a usual direct current (DC) power (FIG. 3) or a usual alternate current (AC) power (FIG. 4).

For example, as shown in FIG. 3, the power supply circuit 33 may include two transistors 35, 36 and a second resistor 37 coupled between the transistors 35, 36, for coupling to the DC power, and for supplying electric power energy to energize the motor 31. As shown in FIG. 4, the power supply circuit 33 may include a triode AC switch or a triggering bi-directional thyristor (TRIAC) 38 for coupling to the AC power, and for supplying electric power energy to energize the motor 31.

The water pumping and controlling device 30 further includes a resistor 34 coupled to the motor 31. For example, as shown in FIG. 5, the resistor 34 may be arranged before the motor 31 or may be coupled between the motor 31 and the power supply circuit 33. The resistor 34 may generate a voltage V_m according to or in response to the loading electric current of the motor 31. It is preferable that the power supply circuit 33 and the motor 31 and the resistor 34 are coupled together in series.

Alternatively, as shown in FIGS. 2-4, the resistor 34 may also be arranged or disposed after the motor 31 or may be coupled to the

rear portion of the motor 31, to generate a voltage V_m according to or in response to the loading electric current of the motor 31.

The water pumping and controlling device 30 further includes a comparator circuit 40 coupled to the resistor 34, to receive the
5 signal from the resistor 34, and to detect whether the motor 31 is working or not, and a processor or control device 50, such as a central processing unit (CPU) 50 coupled to the comparator circuit 40 to receive the signal from the comparator circuit 40, and to judge or to determine whether the motor 31 is working or not, and then to
10 determine whether to switch off the motor 31 or not.

As shown in FIGS. 3 and 4, the comparator circuit 40 includes a first amplifier 41 coupled to the resistor 34, and having an outlet 42 coupled to a second amplifier 43 via such as a diode 44. The second amplifier 43 includes an outlet 45 coupled to the control
15 device 50, for sending the comparing signals to the control device 50.

In operation, the resistor 34 may generate a voltage signal V_m according to or in response to the loading electric current of the motor 31. For example, when the motor 31 is working or is pumping
20 the water, a greater electric current may flow through the motor 31 and the resistor 34 such that a greater voltage signal V_m may be occurred in or generated by the resistor 34. On the contrary, when the motor 31 is stopped or is not working, a less electric current may flow through the motor 31 and the resistor 34 such that a less
25 voltage signal V_m may be occurred in or generated by the resistor 34.

The voltage signal V_m may then be sent to the comparator

circuit 40, and may be amplified by the first amplifier 41 into an amplified signal which is then sent to the other amplifier 43, in order to be compared with a predetermined signal or value, and to determine or generate a compared output, such as a “0” output or a
5 “1” output.

For example, when the output is “0” or when the voltage signal V_m is low, it means that the motor 31 is unloaded or that the motor 31 do not pump or propel any water. At this moment, the control device 50 may turn off the motor 31 by such as switching off the
10 power supply circuit 33, for example, to stop the motor 31 and to prevent the motor 31 from idling. On the contrary, when the output is “1” or when the voltage signal V_m is high, it means that the motor 31 is still loaded or is still working or pumping the water. At this moment, the control device 50 will not turn off the motor 31 or
15 will not switch off the power supply circuit 33, to allow the motor 31 to maintain the water pumping mode.

For example, as shown in FIG. 1, when the water outlet device 12 is switched on or actuated by users, the water may flow out of the reservoir 10, and the motor 31 may then be loaded and may be
20 switched on or may be actuated to pump the water from the reservoir 10 to the container 20. A switch 51 may further be provided and coupled to the control device 50 (FIGS. 3, 4), to trigger or actuate or operate the motor 31 to pump the water out of the reservoir 10.

25 When the water outlet device 12 is switched off or released by the users, or when the reservoir 10 is empty, no water may flow out of the reservoir 10 or no water may flow through the motor 31, such

that the motor 31 may be unloaded and do not pump the water. At this moment, the control device 50 may turn off the motor 31 or may switch off the power supply circuit 33 again, to stop the motor 31 and to prevent the motor 31 from idling.

5 Accordingly, the water pumping and controlling device in accordance with the present invention may be used for detecting and/or controlling the flowing of the water into and out of water containers or reservoirs or the like automatically.

10 Although this invention has been described with a certain degree of particularity, it is to be understood that the present disclosure has been made by way of example only and that numerous changes in the detailed construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

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